

4147800 PCT/PT 1 6 FEB 1999

FORM PTO-1390 (REV 10-94)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			10178.85USWO
			U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5) Unknown 09/242361
INTERNATIONAL APPLICATION NO. PCT/FI97/00559	INTERNATIONAL FILING DATE 18 September 1997	PRIORITY DATE CLAIMED 19 September 1996	
TITLE OF INVENTION LOCATION MANAGEMENT OF A WIRELESS TERMINAL			
APPLICANT(S) FOR DO/EO/US Lauri LAHTINEN			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(l). 4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input checked="" type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). 10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). 			
Items 11. to 16. below concern document(s) or information included:			
11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.			
12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.			
13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.			
14. <input type="checkbox"/> A substitute specification.			
15. <input type="checkbox"/> A change of power of attorney and/or address letter.			
16. <input checked="" type="checkbox"/> Other items or information: Courtesy copy of application; Form 1449; 3 cited references; 5 sheets formal drawings			

U.S. APPLICATION NO (If known, see 37 C F R 1.5) Unknown		INTERNATIONAL APPLICATION NO PCT/FI97/00559		ATTORNEY'S DOCKET NUMBER 10178.85USWO	
17. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492(a) (1)-(5)): Search Report has been prepared by the EPO or JPO.....\$840.00 International preliminary examination fee paid to U.S. Patent and Trademark Office (37 CFR 1.492(a)(1)).....\$670.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....\$760.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(3)) paid to USPTO\$970.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4).....\$96.00					
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$970.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	11 -20 = 0		X \$18.00	\$0.00	
Independent claims	3 -3 = 0		X \$78.00	\$0.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$260.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$970.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).				\$	
SUBTOTAL =				\$970.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				+ \$	
TOTAL NATIONAL FEE =				\$970.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				+ \$ 40.00	
TOTAL FEES ENCLOSED =				\$1,010.00	
				Amount to be: refunded \$	
				charged \$	
a. <input checked="" type="checkbox"/> Check(s) in the amount of <u>\$970.00 and \$40.00</u> to cover the above fees is enclosed.					
b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.					
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>13-2725</u> .					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO Michael B. Lasky MERCHANT & GOULD 3100 Norwest Center 90 South Seventh Street Minneapolis, MN 55403					
				SIGNATURE	
				NAME	Michael B. Lasky
				REGISTRATION NUMBER	29,555

09/242361

300 Rec'd PCT/PTO 16 FEB 1999

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Lauri LAHTINEN Docket No.: 10178.85USWO
Serial No.: Unknown Filed: Concurrent Herewith
Int'l Appln No.: PCT/FI97/00559 Int'l Filing Date: 18 September 1997
Title: LOCATION MANAGEMENT OF A WIRELESS TERMINAL

CERTIFICATE UNDER 37 CFR 1.10:

"Express Mail" mailing label number: EL176165815US

Date of Deposit: February 16, 1999

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Assistant Commissioner for Patents, Washington, D.C. 20231.

By: 

Name: Walter White

PRELIMINARY AMENDMENT

Box PCT
Assistant Commissioner for Patents
Washington, D. C. 20231

Dear Sir:

In connection with the above-identified application filed herewith, please enter the following preliminary amendment:

IN THE ABSTRACT

Insert the attached Abstract page into the application as the last page thereof.

IN THE SPECIFICATION

A courtesy copy of the present specification is enclosed herewith, but the World Intellectual Property Office (WIPO) copy should be relied upon if it is already in the U.S. Patent Office.

IN THE CLAIMS

Please examine the claims as amended.

In claim 3, line 1, replace "claim 1 or 2" with --claim 1--.

In claim 4, line 1, replace "claims 1 to 3" with --claim 1--.

In claim 6, line 1, replace "any one of the claims 1 to 5" with -claim 1--.

REMARKS

A new abstract page is supplied to conform to that appearing on the publication page of the WIPO application, but the new Abstract is typed on a separate page as required by U.S. practice.

The above preliminary amendment is made to remove multiple dependencies from claims 3, 4, and 6.

Applicant respectfully requests that the preliminary amendment described herein be entered into the record prior to calculation of the filing fee and prior to examination and consideration of the above-identified application.

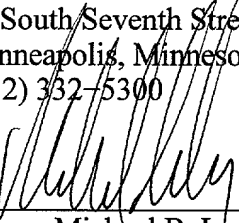
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's primary attorney-of record, Michael B. Lasky (Reg. No. 29,555), at (612) 336-4634.

Respectfully submitted,

MERCHANT, GOULD, SMITH, EDELL,
WELTER, & SCHMIDT, P.A.
3100 Norwest Center
90 South Seventh Street
Minneapolis, Minnesota 55402
(612) 332-5300

Dated: February 16, 1999

By



Michael B. Lasky
Reg. No. 29,555
MBL:vvh

ABSTRACT

Location data of a subscriber terminal (TE) are maintained by means of intelligent network technique. Signaling between a telephone exchange (EXC) and a PBX is supplemented with extra information including the information on the location of the subscriber TE. A roaming

5 number ROAM# is allocated to a TE moving into the area of a Visited PBX (VPBX). Call setup protocol between the PBX and the EXC is supplemented with an extra packet (EI) supporting the subscriber mobility in such a way that the information on the subscriber's location can be transmitted to a Service Control Point (SCP) of the intelligent network. In connection with location updating, the VPBX informs the intelligent network (SCP) that the TE tries to register to
10 the area of the VPBX. The intelligent network (SCP) checks whether said subscriber has the right to use the services of the VPBX. In case of a call to the TE, the EXC asks the intelligent network (SCP) for the location information of the TE on the basis of the subscriber number of the TE. Subsequently, the EXC establishes a connection with the PBX indicated by the location information, which PBX sets up a call to said TE.

LOCATION MANAGEMENT OF A WIRELESS TERMINAL**FIELD OF THE INVENTION**

The invention relates to supporting the mobility of wireless terminals, such as DECT telephones, in a telephone network.

BACKGROUND OF THE INVENTION

With reference to Figure 1, wireless terminals, such as DECT telephones, as described in ETSI Standard 300 175 Radio Equipment and System: Digital Cordless European Telephone, Common Interface, Sections 1 to 9, can be connected to a Public Integrated Services Network PISN. The DECT System comprises a base station FP (Fixed Part), usually connected to the PISN via a Private Branch Exchange PBX. There are three main types of base stations FP: a home base station or a base station to be connected to an office PBX and so-called telepoint base stations. In a conventional wired telephone network, e.g. signalling protocols DPNSS and DSS.1 are used, which are described in the CCITT (now ITU) Specification: "DSS.1, Q.930 to Q.940, 1989, Digital Subscriber Signalling System No. 1, Network Layer, User-Network Management". These signalling protocols support the mobility of the subscriber very poorly or not at all.

To support the subscriber mobility, services of a PBX network can be supplemented with Intelligent Network (IN) technique determined e.g. in the specifications of ITU Q.1200 series. By IN technique, it is possible to combine telecommunications networks of different types, such as the PISN and cellular mobile systems, e.g. GSM and NMT, not shown separately in Figure 1. The principle of IN technique is that the signalling needed for establishing a speech connection takes place controlled by the IN, but the actual speech connection is switched by known functions of the communications network in question.

One of the services provided by the IN is Follow Me Destination (FMD) call transfer. By means of this service, the subscriber may control his incoming calls to a desired number, which can be e.g. an extension number of the PBX network or a mobile network number. In Figure 1, for example, a Terminal Equipment TE1 user moving from a first DECT system DECT1 to a second system DECT2 may order a call transfer to an extension number of this second system.

The main problem with the solution described is that a call transfer requires activity and carefulness of the subscriber. In solutions of the prior art, the subscriber has to know the extension number to which calls shall be transferred and to remember to give this information to the operator.

5

SUMMARY OF THE INVENTION

The object of the invention is to develop a method and an equipment implementing the method in such a way that the above problems with the subscriber mobility and location management can be solved. The objects of
10 the invention are achieved by a method and a system, which are characterized in what is set forth in the independent claims. Preferred embodiments of the invention appear from the dependent claims.

The invention is based on the fact that subscriber location data are maintained by means of IN technique. Signalling between a telephone ex-
15 change and a PBX is supplemented with extra information on the location of the subscriber terminal.

An advantage of the method and system of the invention is an improved support to the mobility of the subscriber. The subscriber does not need to determine separately the extension number to which he wishes to transfer
20 his calls. It is enough that the subscriber starts his phone in the area of a new PBX. The invention does not require changes in existing terminals. The invention can also be applied to double-mode terminals, such as GSM/DECT telephones, which means that the invention saves radio resources, since the greatest possible part of the signalling takes place via a wired telephone net-
25 work.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in greater detail by means of preferred embodiments with reference to the attached drawings, in which
30

Figure 1 shows such parts of a known telecommunications system which are substantial for the understanding of the invention;

Figures 2A and 2B show a location updating according to the invention in a DECT system; and

Figure 3A shows signalling in case of a mobile terminated call; and
35 Figure 3B shows signalling in case of an internal call in a PBX.

DETAILED DESCRIPTION OF THE INVENTION

With reference to Figure 1, the invention suggests that the functionality of a PBX is supplemented in a way which is to some extent analogous with the home and/or visitors location register of mobile systems. A home PBX (HPBX) is allocated to each subscriber of a wireless system. In this application, a PBX other than HPBX is called a Visited PBX (VPBX). Each PBX comprises both HPBX and VPBX functionality. Within the scope of this application, a transmitting exchange EXC is any exchange via which the PBXs are connected to the PISN and/or mobile networks. The EXC is supposed 1) to have an interface to the PBXs for a speech connection, 2) to support an interface to a Service Switching Point SSP of the IN for a signalling connection and 3) to support the INAP signalling protocol extended for this purpose (INAP extensions).

According to the invention, a roaming number ROAM# is allocated to a subscriber moving to the area of a VPBX. In the numbering plan, a fixed area can be reserved from the number space of said PBX for the roaming numbers. In this way, it is possible to avoid consuming the numbers of the PISN.

A functionality supporting subscriber mobility can be implemented for instance by a suitable addition to the conventional call setup protocol between the PBX and the EXC. Messages used for call setup may include an extra packet EI (Extra Information). The EI packet can be coded in different ways in different signalling protocols. In case of the DSS.1 protocol of the example, suitable information elements are e.g. FACILITY and USER_TO_USER. A separate specific field can also be defined for this purpose. The extra packet EI is transparent to the EXC (the exchange does not react to it). The purpose of the EI packet is to support the subscriber's mobility in such a way that an information on the subscriber's location can be transmitted via the SSP of the IN to a Service Control Point SCP of the IN. On the other hand, the SCP maintains data in a Service Data Point SDP. By means of the extra packet, information on subscriber identification or authentication, for instance, can be transferred.

A logic interface between the PBX and the IN - especially its SCP - comprises two functionalities according to the invention: location updating and location cancellation.

At Location Updating LU, the VPBX informs the SCP of the IN that the terminal TE tries to register to the area of a new PBX. Upon receiving this information, the SCP checks from the SDP the subscriber data and especially whether said subscriber has the right to use the services of the new VPBX.

- 5 At Location Cancellation LC, the SCP removes from the SDP the information on that the terminal TE is in the area of the VPBX.

Figure 2A shows a possible signalling when a terminal registers to the area of a VPBX. To keep the figure illustrative, only steps essential for the invention are shown. In this application, reference numerals 2A-1, 2B-1, etc.
10 signify corresponding steps in Figures 2A, 2B, etc.

In step 2A-1, the terminal TE sends to the VPBX a Location Update Request including the identity of the TE or its subscriber. It is assumed initially that the identity is e.g. an International Portable User Identity IPUI. The VPBX notices that said terminal is not registered to this PBX and that the HPBX of
15 the terminal is other than the VPBX. Therefore, a calling subscriber's roaming number (CLG#ROAM#, Calling Number Roaming Number) is allocated to the terminal. The roaming numbers are preferably reserved from the number space of the PBX. In this way, it is possible to avoid consuming the numbers of the PISN.

20 In step 2A-2, the PBX sends the EXC a call setup request SETUP including, in addition to the number of the called subscriber, i.e. subscriber B, also the roaming number allocated in step 2A-1 and the above-mentioned extra packet EI. The EI packet includes the information on that the type of the task is location updating LU of a terminal/subscriber whose identity is IPUI.
25 The EXC performs a number analysis of the called subscriber number and notices that an IN service request has to be made for location updating of the terminal TE in the SDP of the intelligent network.

In step 2A-3, the EXC sends a service request INVOKE to the SCP of the IN. This joins together the identity of the terminal or its subscriber, such
30 as the IPUI number, and the subscriber number of the terminal, such as the TE_MSISDN number, which is returned to the EXC in a Connect message in step 2A-4. In step 2A-5, the EXC sends the HPBX a location cancellation message LC, which can be for instance a call setup request SETUP supplemented with an extra packet EI according to the invention. The EI packet in-
35 cludes in this step an information on that the subscriber location of the terminal in the area of the HPBX is cancelled. In step 2A-6, the HPBX sends an ALERT

message to the EXC. In step 2A-7, the EXC sends a corresponding ALERT message to the VPBX, which in step 2A-8 acknowledges the location updating of the terminal TE. In steps 2A-9 and 2A-10, the signalling connections are cancelled.

- 5 If an International Portable Equipment Identity IPEI is used instead of the subscriber's IPUI, the signalling functions as described above, except that the location data of the physical terminal TE are maintained, instead of those of the subscriber. By implementing the location management of the invention by means of the signalling relating to a call setup, the existing signalling and the SCP interface can be used without any great changes.

10 If the TE moves from the area of a first VPBX into the area of a second VPBX, the signalling takes place as above, except that the location cancellation LC is sent to that VPBX where the subscriber's IPUI (or the IPEI of the terminal) last was updated.

- 15 Figure 2B shows the signalling in case if the TE returns to the area of its HPBX. The signalling corresponds to the steps described in connection with Figure 2A, but the tasks of the HPBX and VPBX are inverse during the steps 2B-1 to 2B-9. The steps 2A-n and 2B-n can be indicated by a common marking 2x-n. The location of the TE is updated from the VPBX to the HPBX.

- 20 With reference to Figure 3A, it is assumed that the terminal TE receives a call, when it is within the area of a VPBX. In case of an incoming call, the signalling takes place as follows. In step 3A-1, a call comes to an EXC from another exchange EXC2 not shown, which can be an exchange of the PISN or equally well a mobile network exchange. In step 3A-2, the EXC sends the SCP of the IN a service request INVOKE including the TE_MSISDN number of the terminal. In step 3A-3 the SCP returns to the EXC a roaming number CLD#ROAM# allocated to the terminal. In step 3A-4, the EXC concludes from the roaming number that the TE exists in the area of the VPBX and sends said PBX a call setup request. The steps 3A-5 to 3A-10 correspond to conventional call setup. In step 3A-5, the terminal TE is paged and, in step 3A-6, it responds to the paging, etc. In step 3A-10, the EXC sends an Access_Complete Message to the other exchange EXC2.

- 30 Figure 3B shows signalling in case of an internal call in an HPBX of a DECT system. It is assumed that subscriber A is TE1 and subscriber B is TE2, respectively. The signalling takes place in the same way as in a conventional DECT call. No service request to the SCP of the IN is needed, because

the HPBX notices in step 3B-2 that the subscriber B is in the area of the same PBX and can start paging according to the prior art. If the subscriber B were in the area of a VPBX, the signalling would take place in the same way as in Figure 3A, but the call would be started from the terminal TE1 of the subscriber A, instead of starting from the EXC2.

A physical implementation of the invention presupposes that location updating and call setup messages according to the prior art are supplemented with extra information elements of the invention. This is implemented in the easiest way by changes in software. To be precise, the arrangement of the invention comprises the following changes:

- a PBX comprises means for indicating location information for a terminal TE of a wireless network;
- the PBX comprises means for adding the location information and the identity (IPUI/IPEI) of the TE to a call setup message SETUP;
- an EXC comprises means for sending the location information and the identity of the TE to a node SCP of an IN in connection with a service request INVOKE;
- the node SCP of the IN comprises means for adding the location information and the identity of the TE to the ISDN number of the TE.

The invention has been described by way of example in connection with the DECT system and assuming that DSS.1 signalling is used between the PBXs and the exchanges. On the basis of the above description, it is easy for one skilled in the art to apply the invention to other wireless telephone systems as well. It is also clear that the invention is equally suitable for location management of all kinds of mobile terminals, not only of a telephone. The invention and its embodiments are thus not restricted to the above examples, but they can vary within the scope of the claims.

CLAIMS (AMENDED 10.1.1999)

1. Method for location updating of a wireless terminal (TE) in a communications system comprising a number of Private Branch Exchanges (HPBX, VPBX) and at least one telephone exchange (EXC) and being connected to a Public Integrated Services Network (PISN) and an intelligent network;

in which method the terminal (TE) sends (2A-1, 2B-1) in connection with a call setup a location updating message to a PBX and the PBX sends (2A-2, 2B-2) a call setup message to the exchange (EXC);

10 characterized in that, additionally in the method,

- the PBX adds (2A-2, 2B-2) the location information and the identity of the terminal (TE) to the call setup message;

- the EXC sends a node (SCP) of the intelligent network a service request (2A-3, 2B-3), including the location information and the identity of the terminal (TE); and

15 - the node (SCP) of the intelligent network adds the location information of the terminal (TE) to the subscriber number, preferably to the MSISDN number, of said terminal (TE).

2. Method according to claim 1, characterized in that in case of an incoming call (3A-1) to the terminal (TE):

- the exchange (EXC) sends (3A-2) the node (SCP) of the intelligent network a service request comprising the subscriber number, preferably the MSISDN number, of the terminal (TE);

25 - the node (SCP) of the intelligent network returns (3A-3) the location information of the terminal (TE) to the exchange (EXC);

- the exchange (EXC) establishes (3A-4) a connection with the PBX indicated by the location information of the terminal (TE), which PBX sets up (3A-5) a call with said terminal (TE).

3. Method according to claim 1 or 2, characterized in that at least one Home Private Branch Exchange (HPBX) is allocated to each terminal (TE), which HPBX notices in case of an internal call that both the calling and the called subscriber are in the area of the same PBX, and in this case the HPBX sets up a call without any service request to the intelligent network.

4. Method according to any one of the claims 1 to 3, characterized in that the PBX (HPBX, VPBX) reserves for the terminal (TE) a

roaming number (CLG#ROAM#) used as location information of the terminal (TE).

5 5. Method according to claim 4, characterized in that a fixed area from a number space of the PBX (HPBX, VPBX) in question is reserved for roaming numbers (CLG#ROAM#) in the numbering plan.

6. Method according to any one of the claims 1 to 5, characterized in that the terminal (TE) is a terminal of the DECT system and the identity of the terminal (TE) is IPUI or IPEI.

10 7. Method according to claim 6, characterized in that the method uses DSS.1 signalling protocol and the location information is positioned in a FACILITY or USER_TO_USER information element.

8. Private Branch Exchange (HPBX, VPBX), comprising:
 first interface means for interfacing to an exchange (EXC/SSP) having a service switching point (SSP) for interfacing to a service control point (SCP) of an intelligent network; and
 15 (SCP) of an intelligent network; and

 second interface means for interfacing to base stations (DECT-FP) of a telephone system supporting wireless terminals (TE), each terminal having an associated identity (IPUI, IPEI);

20 characterized in that the PBX is adapted to, in response to a location updating of one of said terminals (TE):

 assign location information (EI) for said terminal (TE) in question;

 send said location information (EI) to said exchange (EXC/SSP) in a message (2A-2, 2B-2) which is suitably formatted so that said Service Switching Point re-sends said location information to said service control point (SCP).

25 9. Private Branch Exchange (PBX) according to claim 8, characterized in that the location information of a terminal (TE) is a roaming number (CLG#ROAM#), which is preferably reserved from the number space of said PBX.

30 10. Arrangement for location updating of a wireless terminal (TE) in a communications system, the arrangement comprising a number of PBXs (HPBX, VPBX) and being in connection with a Public Integrated Services Network (PISN) and an intelligent network;

 in which arrangement the terminal (TE) comprises means for sending a location updating message (LOC_UPD_REQ) in connection with a call setup to a PBX and the PBX comprises means for sending a call setup message (SETUP) to an exchange (EXC);
 35

characterized in that additionally

- the PBX comprises means for allocating location information to the terminal (TE) of the wireless network;
 - the PBX comprises means for adding the location information and
- 5 the identity of the terminal (TE) to the call setup message (SETUP);
- the exchange (EXC) comprises means for sending the location information and the identity of the terminal (TE) to a node (SCP) of the intelligent network in connection with a service request (INVOKE);
 - the node (SCP) of the intelligent network comprises means for
- 10 adding the location information and the identity of the terminal (TE) to the subscriber number, such as a MSISDN number, of the terminal (TE).

11. Arrangement according to claim 10, characterized in that the location information of the terminal (TE) is a roaming number (CLG#ROAM#) allocated by the PBX.

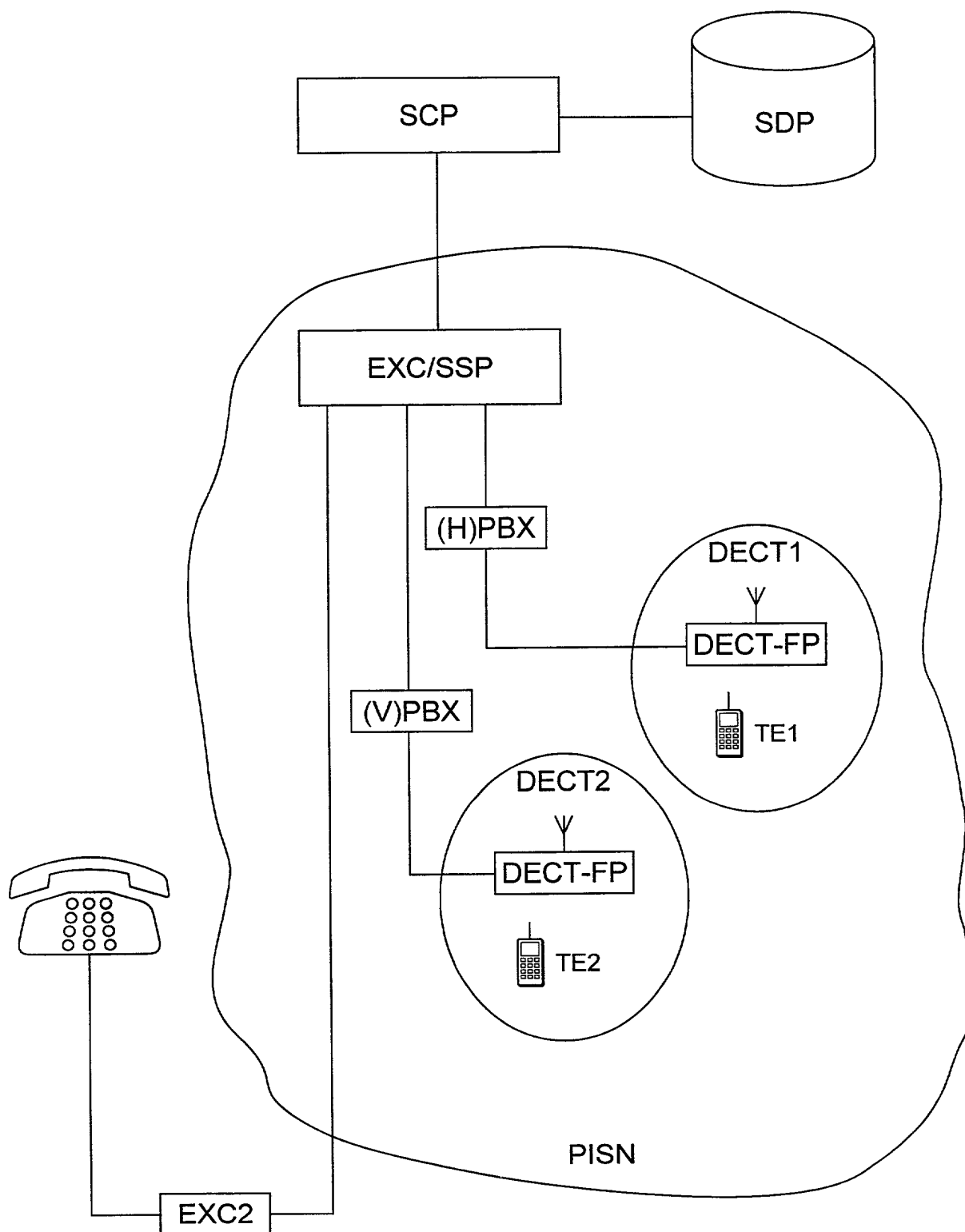
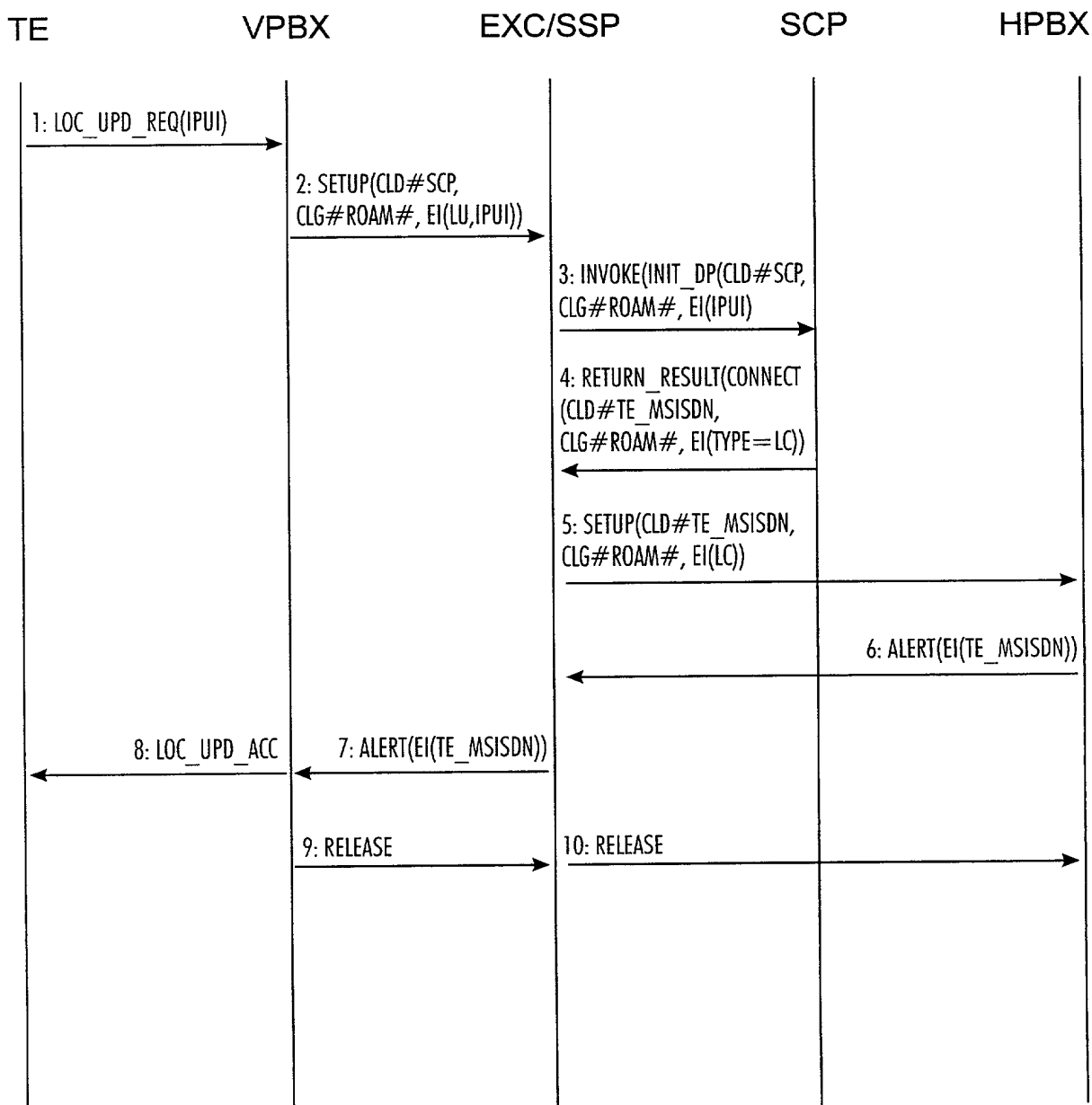
Fig. 1
(PRIOR ART)

Fig. 2A



11-10-1999

Fig. 2B

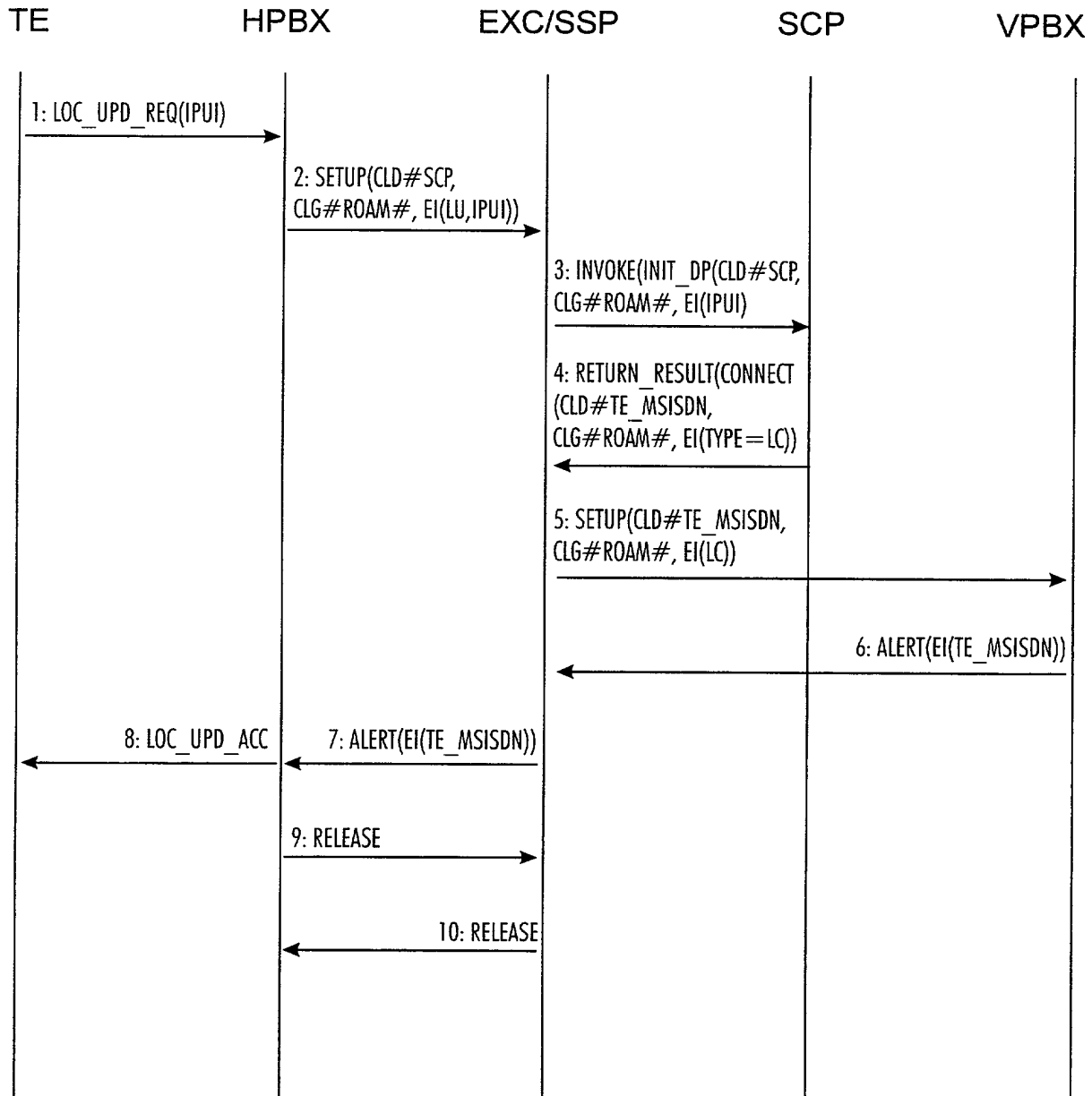


Fig. 3A

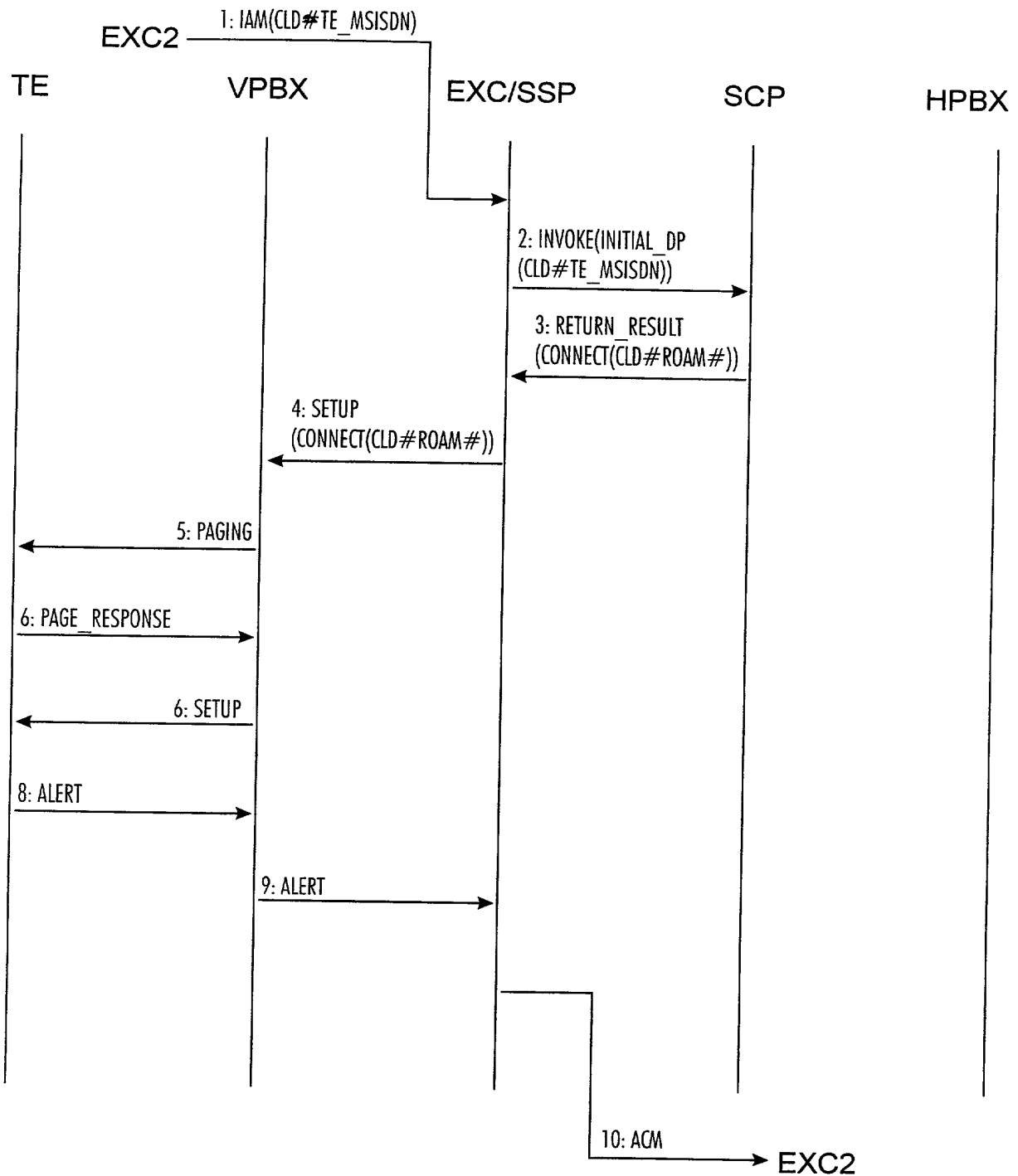
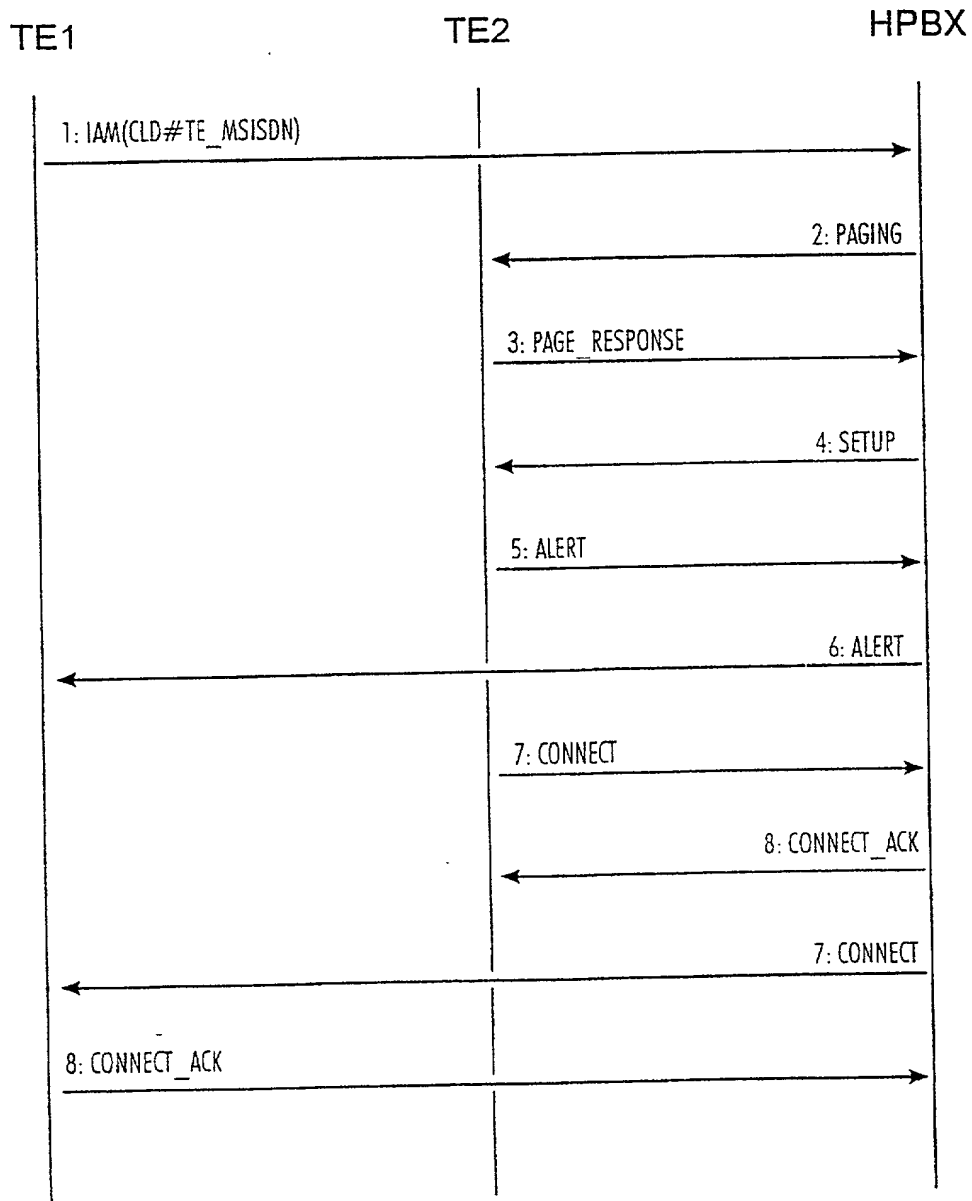


Fig. 3B



MERCHANT & GOULD

United States Patent Application

INSTRUCTIONS

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Insert TITLE of invention

Location management of a wireless terminal

Check a or b

The specification of which

a. ☐ is attached hereto

b. ☐ was filed on _____

If "b" checked, complete

as application serial no. _____

and was amended on _____ (if applicable)

If PCT Application

(in the case of PCT-filed application)

Insert Int. application
number & filing date

described and claimed in international no. PCT/FI97/00559 filed 18 September 1997

and as amended on 11 January 1999 (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a). (Reprinted on back side).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent of inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

Prior applications
Check a or b

a. ☐ no such applications have been filed.

b. ☒ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
Finland	963722	19/09/1996	
ALL FOREIGN APPLICATIONS, IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

If "b" checked, complete

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

For Continuation-in-Part
(CIP) Applications,
complete

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS(patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Bartungale, Kari H.	Reg. No. 35,183	Hassing, Thomas A.	Reg. No. 36,159	Schumann, Michael D.	Reg. No. 30,422
Bazili, Brian H.	Reg. No. 37,950	Hullson, Randall A.	Reg. No. 31,838	Schwappach, Karl G.	Reg. No. 35,786
Beard, John L.	Reg. No. 27,612	Khuth, Daniel J.	Reg. No. 32,146	Schwagman, Micheal L.	Reg. No. 25,816
Beck, Robert C.	Reg. No. 28,184	Kowalchyk, Alan W.	Reg. No. 31,535	Sebald, Gregory A.	Reg. No. 33,280
Bogucki, Raymond A.	Reg. No. 17,426	Kowalchyk, Katherine M.	Reg. No. 36,848	Smith, Phillip H.	Reg. No. 20,476
Brennan, Thomas F.	Reg. No. 35,075	Lasky, Michael B.	Reg. No. 29,555	Sorenson, Andrew D.	Reg. No. 33,506
Bruss, Steven C.	Reg. No. 34,130	Lundberg, Steven W.	Reg. No. 30,568	Strawbridge, Douglas A.	Reg. No. 28,376
Byrne, Linda M.	Reg. No. 32,404	Lynch, David W.	Reg. No. 36,204	Strothoff, Kristine M.	Reg. No. 34,259
Carlson, Alan G.	Reg. No. 25,959	Mau, Michael L.	Reg. No. 30,087	Sumner, John P.	Reg. No. 29,114
Caspers, Philip P.	Reg. No. 33,227	McDonald, Daniel W.	Reg. No. 37,044	Sumners, John S.	Reg. No. 24,216
Clifford, John A.	Reg. No. 30,247	McDonald, Wendy M.	Reg. No. 32,427	Tellekson, David K.	Reg. No. 32,314
Conrad, Timothy R.	Reg. No. 30,164	Michel, Michelle M.	Reg. No. 33,968	Underhill, Albert L.	Reg. No. 27,403
DiPietro, Mark J.	Reg. No. 28,707	Moy, R. Carl	Reg. No. 30,725	Vandenburgh, J. Derek	Reg. No. 32,179
Edell, Robert T.	Reg. No. 20,187	Muering, Ann M.	Reg. No. 33,977	Vietzko, Lance L.	Reg. No. 36,708
Freed, Robert C.	Reg. No. 32,569	Nelson, Albin J.	Reg. No. 28,650	Welter, Paul A.	Reg. No. 20,890
Gahner, Peter J.	Reg. No. 36,517	Raasch, Kevin W.	Reg. No. 35,651	Williams, Douglas J.	Reg. No. 27,054
Gates, George H.	Reg. No. 33,500	Reiland, Earl D.	Reg. No. 25,767	Woessner, Warren D.	Reg. No. 30,440
Golla, Charles E.	Reg. No. 26,836	Roggen, Jesse D.	Reg. No. 34,417	Wood, Gregory B.	Reg. No. 28,133
Gould, John D.	Reg. No. 18,223	Rothfus, Joel A.	Reg. No. 33,277		
Gresens, John J.	Reg. No. 33,112	Schmidt, Cecil C.	Reg. No. 20,566		
Hamre, Curtis B.	Reg. No. 29,165	Schuman, Mark D.	Reg. No. 31,197		

I hereby authorize them to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/organization/who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Merchant, Gould to the contrary.

Please direct all correspondence in this case to Merchant, Gould, Smith, Edell, Welter & Schmidt at the address indicated below (or if no address is specified, the first address):

- ☒ 3100 Norwest Center, Minneapolis, MN 55402-4131 ☐ 1000 Norwest Center, St. Paul, MN 55101-2701
Telephone No. (612) 332-5300 Telephone No. (612) 298-1055
- ☐ Suite 1700, 11100 Santa Monica Boulevard, Los Angeles, CA 90025-3302
Telephone No. (310) 445-1140

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Insert FULL name(s)
AND address(es) of
actual inventor(s)

201	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY	
202	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY	
203	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY	
SIGNATURE OF INVENTOR 201		SIGNATURE OF INVENTOR 202		SIGNATURE OF INVENTOR 203
DATE		DATE		DATE

Each inventor must
sign & date

Note: No legalization or
other witness required

For Additional Inventors:

- ☐ Check box and attach sheet with same information, including date and signature.